**Topic 2.6: Structure of DNA and RNA**

**Essential Idea: The structure of DNA allows efficient storage of genetic information.**

**Statements & Objectives:**

**2.6.U1 The nucleic acids DNA and RNA are polymers of nucleotides.**

State the two types of nucleic acid.

**(State**: Give a specific name, value or other brief answer without explanation or calculation)

Outline the parts of a nucleotide.

​**(Outline**: Give a brief account or summary)

Identify and label carbons by number (for example, C1, C2, C3) on a nucleotide drawing.

(**Identify:** Find an answer from a given number of possibilities)

Explain how nucleotides can connect to form a nucleic acid polymer.

(**Explain**: Give a detailed account including reasons or causes)

State the names of the nitrogenous bases found in DNA and RNA.

**(State**: Give a specific name, value or other brief answer without explanation or calculation)

Identify nitrogenous bases as either a pyrimidine or purine.

(**Identify:** Find an answer from a given number of possibilities)

State the complementary base pairing rules.

**(State**: Give a specific name, value or other brief answer without explanation or calculation)

**2.6.U2 DNA differs from RNA in the number of strands present, the base composition and the type of pentose.**

Compare the structure of DNA and RNA.

(**Compare:** Give an account of similarities and differences between two (or more) items, referring to both (all) of them throughout.)

**2.6.U3 DNA is double helix made of two antiparallel strands of nucleotides linked by hydrogen bonding between complimentary base pairs.**

Define antiparallel in relation to DNA structure.

**(Define**: Give the precise meaning of a word, phrase, or physical quantity.)

Outline the formation of a DNA double helix by hydrogen bonding between nitrogenous bases.

​**(Outline**: Give a brief account or summary)

Identify the four bases of DNA based on the numbers of rings (purines or pyrimidines) and the number of hydrogen bonds it can form.

(**Identify:** Find an answer from a given number of possibilities)

State the number of nitrogenous bases per complete turn of the DNA double helix.

**(State**: Give a specific name, value or other brief answer without explanation or calculation)

**2.6.A1 Crick and Watson’s elucidation of the structure of DNA using model making.**

Outline the role of Chargaff, Watson, Crick, Franklin and Wilkins in the discovery of DNA structure.

​**(Outline**: Give a brief account or summary)

Explain how Watson and Crick used model building to determine the structure of DNA.

(**Explain**: Give a detailed account including reasons or causes)

**2.6.S1 Drawing simple diagrams of the structure of single nucleotides of DNA and RNA, using circles, pentagons, and rectangles to represent phosphates, pentoses and bases.**

Draw the basic structure of a single nucleotide (using circle, pentagon and rectangle).

(**Draw:** Represent by means of pencil lines.)

Draw a simple diagram of the structure of RNA.

(**Draw:** Represent by means of pencil lines.)

Draw a simple diagram of the structure of DNA,

(**Draw:** Represent by means of pencil lines.)

Identify and label the 5’ and 3’ ends on a DNA or RNA diagram

(**Identify:** Find an answer from a given number of possibilities)

**2.6.NOS Using models as representation of the real world- Crick and Watson used model making to discover the structure of DNA.**

List types of models used in science.

**(List**: Give a sequence of brief answers with no explanation.)

State a common feature of models in science.

**(State**: Give a specific name, value or other brief answer without explanation or calculation)

List ways in which models are different from the structure or process it represents.

**(List**: Give a sequence of brief answers with no explanation.)

**Key Terms**

3'

micropipette

5'

cytosine

pentose

deoxyribonucleic acid

X ray diffraction

​base pair ruling

adenine

nitrogenous base

phosphate

deoxyribose

polymer

​Watson

​ribose

antiparallel

nucleic acid

double helix

nucleoid

purine

pyrimidine

​base

chromatin

​nucleotides

nucleosome

chromosome

nucleotide

guanine

site

nucleus

Crick

Thymine

Histone

hydrogen bond

Franklin

Chargaff